Student Mathematic Connection Ability Through Ict Assisted Preprospec Learning Model

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Article Info	Abstract
	There are five standard processes in learning mathematics, one of which is connection. In SMK mathematics learning, the ability to connect mathematics is needed by students, namely in mathematics itself, in subjects other than mathematics, as well as in solving real-life problems. Mathematical problem solving requires the ability to connect mathematics to able to connect between mathematical ideas to find solutions to problems. Self-confidence is one of several character values that are cultivated in learning. To face a problem requires an attitude of confidence in one's abilities. This attitude can affect students' motivation and performance in mathematics learning. Thus, the ability to connect mathematics and self-confidence have an important role in learning mathematics. The purpose of this study was to determine whether the PREPROSPEC learning model was effective in terms of the students' mathematical connection abilities. This research is a type of mixed-method research. The research design the researchers chose was quasi-experimental. The population in this study were students of class XI SMK Negeri 1 Purbalingga majoring in TKJ 2020/2021 academic year. The results showed that the ICT-assisted PREPROSPEC learning model was effective on the student's connection ability. This learning model has the advantage of being more flexible in its application. In addition, the additional use of ICT is expected to help students develop mathematical connection skills more easily.

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INTRODUCTION

The term technology in learning has shifted to information technology, communication technology, and information and communication technology, which has been officially used by UNESCO as Information and Communication Technology (ICT) (Surjono and Gafur, 2010). According to Yohannes et al. (2016), learning using ICT in the form of multimedia is more effective than learning using conventional methods..

The National Council of Teachers of Mathematics (NCTM) states that there are five basic abilities that a person must have in learning mathematics, namely problem-solving skills (problem-solving abilities), reasoning and proof skills (reasoning and evidence skills), communication skills (communication skills), connection skills (ability to connect or associate something), and the last is representation skill.

Mathematical connection is one of the important abilities possessed by students in Indonesia. The importance of having the ability to connect mathematically is contained in one of the objectives of learning mathematics in secondary schools which is currently still used by most secondary schools in Indonesia (Depdiknas: 2006) which states that one of the objectives of learning mathematics is: understanding the concept of mathematics, explaining the relationship between concepts. and apply concepts or algorithms in a flexible, accurate, efficient, and precise manner in solving mathematical problems.

Sumarmo (Gordah, 2009) describes several mathematical connection indicators that can be used, namely: (1) looking for relationships of various representations of concepts and procedures; (2) understanding the relationship between mathematical topics; (3) apply mathematics in other fields or everyday life; (4) understand the equivalent representation of a concept; (5) looking for a relationship between one procedure and another in an equivalent representation; and (6) applying the relationship between mathematical topics and between mathematical topics and topics outside mathematics.

The learning model introduced by Dewi, N.R. (2020) is a learning model to help students work on math problems coherently and gradually. This model has five learning stages, namely Prepare, Problem Solving, Presentation, Evaluation, Conclusion. This learning model is known as PREPROSPEC. The word PREPROSPEC is an acronym for the model's stage signatures.

The learning model has several advantages, namely being able to train students to be able to construct new concepts by applying existing mathematical concepts (assimilation process) or modifying other mathematical methods or concepts through an exploration process in constructing new concepts (accommodation process). In addition, there is also scaffolding during learning so that there is an exchange of complementary information to get a correct understanding of a concept so that the actual development of students can be achieved optimally (Dewi, N.R, 2020). According to Semler (2005), blended learning is a learning method that combines online lectures and face-to-face (offline) lectures. This method of learning is very suitable for students who want to continue their education and get a Bachelor's degree but while working to build a career. With this method, you will get a lot of conveniences when learning.

In this study, researchers chose the Edmodo application as a medium for blended learning, because Edmodo is widely known in the world of education in Indonesia and can be obtained free of charge. Edmodo is an interesting application for teachers and students with social elements that resemble Facebook, but in fact, there is greater value in this social network-based educational application. Edmodo, which is also based on a collaboration cloud, is an application that is safe enough for teachers and students to use. Edmodo is one way to build students' enthusiasm for learning. (Rismayanti, Anti: 2012) The application of Edmodo itself has been applied in various learning activities. Research conducted by Suherni suggests that the use of Edmodo can be developed and can meet the needs of learning that is more interactive with the physical environment so that students will be more active and able to solve various problems encountered.

Edmodo is a private microblogging platform developed for teachers and students, with student privacy in mind. Teachers and students can share notes, links, and documents. The teacher also can

send alerts, events, and assignments to students and can decide to post something in a publicly visible time frame. Edmodo is designed to make students excited about learning in a more intimate environment. In Edmodo, teachers/lecturers can continue online classroom discussions, provide polls to check student understanding, and award badges to students/students individually based on performance or behavior.

Edmodo has several benefits in learning as follows:

1) Edmodo is a very efficient means of communication and discussion for teachers and students. 2) With Edmodo, students with one another can easily interact and discuss with a direct observation from their teachers. 3) In addition, Edmodo facilitates communication between teachers, students, and parents. 4) As an appropriate means for exams and quizzes. 5) The teacher can provide teaching materials such as questions, photos, learning videos to students easily. In addition, students can also download the teaching material. 6) With Edmodo, parents can easily monitor their children's learning activities. 7) Make it easier for the teacher to give questions from anywhere and anytime.

The term technology in learning has shifted to information technology, communication technology, and information and communication technology, which has been officially used by UNESCO as Information and Communication Technology (ICT) (Surjono & Gafur, 2010). Through the use of ICT media in the implementation of learning, it is hoped that learning objectives can be achieved more easily and effectively for students.

In addition, Sokolowski et al. (2015) in their research argued that computer media can provide students with opportunities to explore mathematical concepts and can improve mathematical problem-solving skills.

Teachers need technology as a medium that has the potential to make mathematics learning better (Loong, 2014).

Learning with the use of ICT will provide maximum benefits to students following the development of the era of the high use of ICT using the internet (Wardono et al, 2018).

The importance of using ICT is not fully implemented by teachers in mathematics learning.

Facts in the field based on the results of observations and interviews with mathematics teachers at SMK N 1 Purbalingga, some teachers still often rely on conventional media rather than the use of ICT. As a result, students are not familiar with the use of ICT, especially in e-learning as a medium of learning. This is the background that will be studied by researchers regarding ICT-assisted learning. Specifically for this research, the learning model to be studied is ICT-assisted PREPROSPEC learning.

Based on the background description, this research will examine the Mathematical Connection Ability of Students through the ICT Assisted PREPROSPEC Learning Model. And so that learning mathematics is not considered a subject with difficult criteria in vocational high schools and so that the learning process is not monotonous and boring so that students' attention remains focused on the teacher and student concentration is not easily broken.

With the aim of the research, 1) to find out whether the PREPOSPEC learning model is effective in terms of students' mathematical connection abilities. 2) to describe students' responses to mathematics learning using the PREPROSPEC learning model with the help of ICT.

METHOD

This type of research is a mixed-method with a quasi-experimental design. This research was conducted in class XI SMKN 1 Purbalingga in the academic year 2020/2021. The research was conducted in the odd semester of the 2020/2021 academic year, namely September 2020. The population in this study were students of class XI SMKN 1 Purbalingga majoring in TKJ 2020/2021 academic year consisting of 24 students so that the sample selection could reflect the characteristics of the students.

Data collection techniques in this study used two techniques, namely: (1) quantitative data collection, (2) tests, (3) qualitative data collection. Qualitative data collection includes observation and interview techniques: (1) determine to whom the interview will be conducted; (2) preparing the subject matter which is the subject of discussion; (3) initiating or opening an interview flow; (4) carry out an

interview flow; (5) confirm a summary of the results of the interview and conclude it; (6) write down the results of the interview in field notes; and (7) identify follow-up interviews with results.

After the research data is collected, the data is processed to find answers to the main problems that have been formulated. The problem in this study is to test whether there is an effect of the application of the PREPROSPEC learning model on students' mathematical connection abilities. The data processing steps that the authors do are as follows: (1) Testing the instrument, before the mathematical connection ability test instrument is used in the study, the instrument is tested first, there are two tests, namely the validity and reliability test. This trial is to determine whether or not the requirements of a good instrument are met so that they can be used in research. Before testing the respondents, the instrument was validated by material experts and learning experts. (2) Normality Test, the normality test is carried out using SPSS 16.0 with the Kolmogorov-Smirnov test. (3) Homogeneity test, homogeneity test in this study using the Levene Statistic Test

RESULTS AND DISCUSSIONS

1. Mathematical Connection Ability

Mathematical connection is two words that come from the mathematical connection. The National Council of Teachers of Mathematics (NCTM) (2000) states that there are five standard processes in mathematics learning, namely (1) problem solving, (2) reasoning and proof, (3) communication (communication), (4) connection (connection), and (5) representation (representation). Connection is one of the five standards of the mathematics learning process.

To select research subjects is a mathematical ability test. The test results were analyzed to classify subjects with high, medium, and low mathematical abilities based on their mathematical abilities. The research subjects were selected to be given a mathematical connection ability test. The results of the test of the mathematical convention ability are the three research subjects, namely high-ability subjects, medium-skilled subjects, and low-ability subjects.

According to Mhlolo et al. (2012), mathematical connections can be broadly defined as (1) the relationship between ideas or processes that can be used to connect topics in mathematics, (2) the process of making or recognizing the relationship between mathematical ideas, and (3) a) causal or logical relationship of interdependence between two mathematical entities. According to Rohendi (2013), the ability of mathematical connections is a person's ability to present internal and external relationships in mathematics, which include relationships between mathematical topics, connections with other disciplines, and connections in everyday life. Thus, the broad meaning of mathematical connection is the relationship between mathematical topics, between mathematics and other disciplines, and between mathematics and real-life or everyday life.

If students can connect mathematical concepts, then students' understanding of mathematics becomes deeper and lasts longer (NCTM, 2000). Meanwhile, according to NCTM (1989), the mathematical connection serves to emphasize that mathematics is taught cohesively and is related between procedures and ideas to be created. In addition, the ability to connect mathematics has an important role to be able to solve mathematical problems which include math problems in everyday life as well as those related to other subjects.

Based on NCTM (2000) regarding the standard of the mathematics learning process, the indicators of mathematical connection ability are (1) recognize and use connections among mathematical ideas (to recognize and use connections between ideas in mathematics), (2) understand how mathematical ideas interconnect and build on one another to produce a coherent whole (understanding how mathematical ideas are related and build one another to produce a unified whole), and (3) recognize and apply mathematics in a context outside of mathematics (recognize and apply mathematics in the context of mathematics). outside of mathematics).

2. ICT-assisted PREPROSPEC Learning Model

The learning model introduced by Dewi, N.R. (2020) is a learning model to help students work on math problems coherently and gradually. This model has five learning stages, namely Prepare, Problem Solving, Presentation, Evaluation, Conclusion. This

learning model is known as PREPROSPEC. The word PREPROSPEC is an acronym for the model's stage signatures.

The syntax of the Preprospec learning model includes:

1. Prepare is done before learning and preparation helps the brain build a better conceptual map (Jensen, 2008). This stage provides an overview to the brain about the new learning that will be given before digging further about the learning to be conveyed. At this stage, the teacher can invite students to do brain exercises (Brain Gym) Gunawan (2006, p. 270) states that "the brain gym is a series of simple body movements used to integrate all parts of the brain to improve learning abilities, build self-esteem and togetherness. ".

2. Problem-Solving is done when in groups, problem solving is a learning method that activates students and can train students to face various problems and can find solutions to problems or solutions to those problems and stimulate thinking

and using insights without seeing the quality of opinion delivered by students.

3. Presentation is done at the time after the discussion (after the students are in groups), the learning outcomes of the presentation model are clear and uncomplicated in helping students acquire, assimilate, store new information, expand conceptual structures and habits of listening and thinking about information.

4. Evaluation is given through tiered questions from easy to difficult, the results of the evaluation can also look back at the impact of learning critically, measure what the target has been able to achieve, and look for any information that can make students achieve good results. The results of the evaluation can be used to provide feedback.

5. Conclusion at this stage students together with the teacher conclude the material that has just been studied. Then given an assignment to strengthen students' knowledge of the material being studied.

s syntax	activity description
1 Prepare	in the Prepare stage, students are allowed to recall the prerequisite material from the material to be studied. This is so that students know and are ready to carry out learning.
2 Problem Solving	in the Problem Solving stage, the teacher coordinates students into heterogeneous groups (4-5) of people. Project worksheets are given to each group via Edmodo and then communication is carried out to solve the problem through the Edmodo media. The components in the project worksheet are 1. Students' real experiences 2. Problems found can be written in the form of descriptions, pictures/photos. 3. Students create and describe symbolic models of their information mathematics activities. 4. Symbolic models and mathematical concepts are manifested in the intertwining of various sub-subjects.
3 Presentation	in the presentation stage, the teacher provides an opportunity for representatives from each group to share the results of their discussion in front of the class in turn. It is used to raise students' perceptions of the material being studied.
4 Evaluation	in the evaluation stage, teachers and students reflect on the activities and results of projects that have been carried out and write them down on the evaluation sheet which is sent to the complaint box menu on the Edmodo media. The evaluation sheet contains the process of project assignments and tells of obstacles in working on project assignments.
5 Conclusion	at the conclusion, the teacher together with the students concludes the material that has been learned in the lesson.

The table above is the learning syntax for the PREPROSPEC model assisted by Edmodo. With the steps from the PREPROSPEC model and the learning activities to be carried out

The ability to connect mathematically requires a systematic, sequential, and gradual thought process. Students' mathematical connection ability is different, due to the influence of differences between different motivation and performance levels. This can be overcome in a way that teachers can provide mathematics learning that can train students' mathematical connections and can foster student motivation and performance. Preprospec learning is a learning model to help students do mathematics in a demanding and gradual manner. Combined with ICT which can help students better understand math problems and increase students' readiness to accept learning. So that the ICT-assisted PREPROSPEC learning model can help students improve their mathematical connection skills.

CONCLUSION

Mathematics is universal knowledge that plays a role in developing other sciences and solving problems in real life. One of the standard processes in mathematics learning according to NCTM (2000) is connection. If students can connect mathematical concepts, then students' understanding of mathematics becomes deeper and lasts longer (NCTM, 2000). In other words, the ability to connect mathematics has an important role to be able to solve mathematical problems which include math problems in everyday life as well as those related to other subjects. The 2013 curriculum is expected to integrate character education or affective attitudes in learning, including mathematics learning.

As well as producing research objectives to find out that PREPROSPEC learning is effective in terms of students' mathematical connection abilities. And the PREPROSPEC learning model can help students solve mathematical problems by connecting ideas between the problems given and the knowledge they already have. In this learning model, students learn how to express ideas, think critically, systematically, logically, and flexibly, and can make decisions to use in solving problems. The use of ICT in this model includes multimedia utilizing Edmodo e-learning.

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